Federal Democratic Republic of Ethiopia

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ET 663 (2001) (English): BARLEY MALT-DETERMINATION DIASTATIC POWER

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Foreword

This Ethiopian Standard has been prepared under the direction of the Technical Committee for Cereals, pulses and derived products (TC 11) and published by the Ethiopian Standards Agency (ESA).

The standard is a reaffirmation for reprint of the Ethiopian Standard ES 663:2001, Barley malt - Determination of diatatic power, with some editorial changes without altering the technical contents in the former text.

Barley malt — Determination of diastatic power

1 Scope

This Ethiopian Standard specifies the method of determination of diastatic power.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Ethiopian Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Ethiopian Standard are encouraged to investigate the possibility of applying the most recent editions of the Ethiopian Standards indicated below. Registers of currently valid standards are maintained in the Quality and Standards Authority of Ethiopia.

ES ISO 6644:2000*, Cereals and milled cereal products-Automatic sampling by mechanical means.*

ES ISO 13690:2001, *Cereals, pulses and milled products – Sampling of static batches.*

3 Reagents

During the analysis, use only reagents of recognized analytical grade reagent and distilled water or water of equivalent purity.

3.1 Acetate buffer solution, 30 g of analytical acetic acid is made to 1 litre with distilled water. 34 g of analytical grade sodium acetate ($NaC_2H_3O_2.3H_2O$) is dissolved in water and made to 500 ml. The two solutions are then mixed to give 1.5 liters of acetate buffer solution with p^H of 4.3 ± 0.1.

3.2 Sodium hydroxide, normal solution

3.3 Starch solution, Merck soluble starch for analysis (No. 1252) is used and the solution is prepared on the day of use. An amount corresponding to 10g of dry matter is taken and stirred to a paste with a little cold water in a mortar. This paste is slowly poured in to 400 ml of boiling water in a beaker so that the water does not cease to boil. The thermometer is washed out with a little cold water into the starch solution which is boiled for 5 minutes. The beaker is then stood in cold water and the contents stirred in or to cool and avoid skin formation. After cooling the solution is made up to 500 ml.

3.4 Distilled water, free from copper contamination

3.5 Iodine solution, a 0.1N solution, 12.7 gI and 20 KI are dissolved in 200 ml of water and made to 1 litre.

3.6 Sulphuric acid, a normal solution

3.7 Thiosulphate solution, a 0.1 N solution 24.82g of dry, transparent crystals of sodium thiosulphate ($Na_2B_40_710H_2O$) are dissolved in 300-400 ml of distilled water and made to 1 liter.

3.8 Thymolphthalein solution, a 0.5% alcoholic solution.

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4 Apparatus

Ordinary laboratory apparatus, and in particular, the following.

4.1 Mill as specified for fine – grind extract

4.2 Mashing or similar beakers of stainless steel or resistance glass.

4.3 Water bath, at 40°C and 20°C (± 0.1°C)

4.4 Graduated flask, 200 ml 500 ml and 1 litre.

4.5 Pipettes, 5 ml graduated, and 50 ml

4.6 Burette, 15 or 25 ml

5 Sampling

Sampling shall be carried out in accordance with ES ISO 13690 or ES ISO 6644.

6 Procedure

Exactly 20 g of a finely ground pale malt or 40 g of a finely ground dark malt is weighed out in the stainless steel or glass beaker. 480 ml of cold distilled water is stirred in and the beaker put in a bath at 40°C and stirred continuously with a glass or stainless steel stirrer for one hour. After this the contents of the beaker are cooled and made to a weight of 520 or 540g.

The contents are then poured on to a filter of the same size and type as that for the standard mash filtration. The first 200 ml of filtrate is discarded and the next 50 ml immediately used for the analysis. Four 200 ml graduated flasks (numbered 1 and 2 for the main test and 3 and 4 for the blank) are taken and 100 ml of starch solution put into each. To the first two (Main test) flasks 5 ml lots of acetate buffer are added and then all four flasks are placed for 20 minutes in the bath at 20°C. At the end of this time an exactly measured 5 ml of the malt extract is pipetted in to flask 1 and after exactly one minute an exactly similar amount is pipetted in to flask 2. Flasks 1 and 2 are well shaken and kept in the bath for exactly 30 minutes from the commencement of the addition of the malt extract. Exactly at the end of the time for each flask 4 ml of sodium hydroxide is added to flasks 1 and 2 in order to inactivate the diastase. Since flasks 3 and 4 contain no buffer solution, it is only necessary to add, 2.35 ml of sodium hydroxide to each of these flasks and then, after shaking, 5 ml of malt extract. Each of the flasks is then made up to the mark and well mixed. The contents of each should be alkaline (blue) to thymolphthalein solution. The sugars formed by diastatic action are estimated indometrically. A 50 ml aliquot of the digest is taken from each of the 200 ml measuring flask and put into one of four corresponding 150 ml conical flasks. To each of these is added 25 ml of iodine solution and 3 ml of sodium hydroxide solution. They are shaken and allowed to stand for 15 minutes (with the flasks closed by loose glass stoppers to prevent loss of iodine). At the end of this time each of the four solutions is acidified by an addition of 4.5 ml of sulphuric acid. The un reacted iodine is then titrated with thisoulphate solution to the disappearance of the blue colour. The reacted iodine should lie between 6 and 12 ml, otherwise the test is repeated with more or less malt.

7 Expression of results

The diastatic power of barley malt shall be calculated as follows: The result are calculated as grams of maltose which would be produced under the specified conditions by 100 g of malt, and, to give this result, the number of ml of iodine reacted in the test is corrected by subtracting the number of ml of iodine reacted in the blank and the result is multiplied by one of the following factors:

Grams of malt used	Factor
10	68.4
20	34.2
40	17.1

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The results so obtained are in windisch-Kolbach units. A near approximation to the corresponding Lintner degrees can be obtained by the use of the following regression equation.

Lintner degree = 0.3 windisch-Kolbach units + 4

The Standard Deviation for individual estimations on a sample of around 270 W.K units ± 23 = ±9%.

8 Test report

The test report shall include the following information

a) reference to this Ethiopian Standard ;

b) the results and method of expression used ;

c) all information necessary for complete identification of the sample ;

d) any unusual features noted during the determination ; and

e) any operation not included in this Ethiopian Standard or in the Ethiopian Standard to which reference is made or regarded as optional.

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Ethiopian Standards Agency

Organization and Objectives

The Ethiopian Standards Agency (ESA) is the national standards body of Ethiopia established in 2010 based on regulation No. 193/2010.ESA is established due to the restructuring of Quality and Standards Authority of Ethiopia (QSAE) which was established in 1970.

ESA's objectives are:-

- Develop Ethiopian standards and establish a system that enable to check weather goods and services are in compliance with the required standards,
- Facilitate the country's technology transfer through the use of standards,
- Develop national standards for local products and services so as to make them competitive in the international market.

Ethiopian Standards

The Ethiopian Standards are developed by national technical committees which are composed of different stakeholders consisting of educational Institutions, research institutes, government organizations, certification, inspection, and testing organizations, regulatory bodies, consumer association etc. The requirements and/ or recommendations contained in Ethiopian Standards are consensus based that reflects the interest of the TC representatives and also of comments received from the public and other sources. Ethiopian Standards are approved by the National Standardization Council and are kept under continuous review after publication and updated regularly to take account of latest scientific and technological changes.
Orders for all Ethiopian Standards, International Standard and ASTM standards, including electronic versions, should be addressed to the Documentation and Publication Team at the Head office and Branch (Liaisons) offices. A catalogue of Ethiopian Standards is also available freely and can be accessed in from our website.

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International Involvement
ESA, representing Ethiopia, is a member of the International Organization for Standardization (ISO), and Codex Alimentarius Commission (CODEX). It also maintains close working relations with the international Electro-technical Commission (IEC) and American Society for Testing and Materials (ASTM).It is a founding member of the African Regional Organization for standardization (ARSO).

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